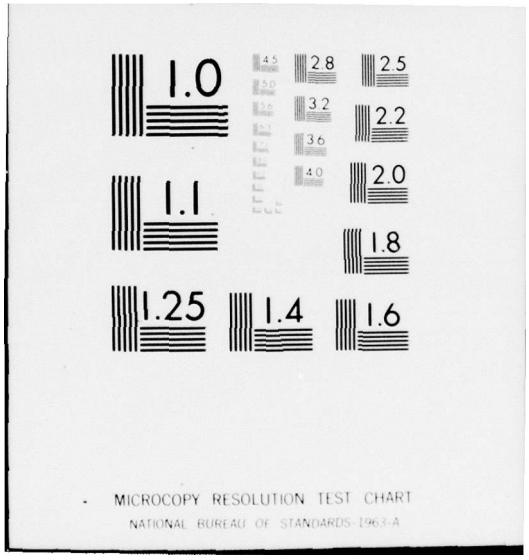
AD-A042 921 OFFICE OF NAVAL RESEARCH LONDON (ENGLAND) F/G 17/2
DIRECT SATELLITE BROADCASTING.(U)
JUL 77 N M BLACHMAN
UNCLASSIFIED ONRL-C-5-77 NL

1 OF 1
ADA042921

END
DATE FILMED
9-77
DDC


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

ONR LONDON CONFERENCE REPORT

C-5-77

12

OFFICE OF NAVAL RESEARCH

BRANCH OFFICE LONDON ENGLAND

DIRECT SATELLITE BROADCASTING

Nelson M. Blachman

12 JULY 1977

UNITED STATES OF AMERICA

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: ONRL-C-5-77	2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle): DIRECT SATELLITE BROADCASTING	5. TYPE OF REPORT & PERIOD COVERED: Conference rept.
6. PERFORMING ORG. REPORT NUMBER	
7. AUTHOR(s): NELSON M. BLACHMAN	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Office of Naval Research Branch Office London, Box 39, FPO New York 09510	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS	12. REPORT DATE: 12 JULY 1977
	13. NUMBER OF PAGES: 14
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office): 16 p.	15. SECURITY CLASS. (of this report): UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Broadcasting
Satellite
Television
International law
Microwaves

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Symposium on Direct Satellite Broadcasting (DSB), held in Dublin 23-25 May 1977, included 17 papers discussing the potentialities and problems of this new medium, which is to bring television to private homes via either 1-meter paraboloidal dishes or larger community antenna. This Symposium follows up the World Adminstrative Radio Conference of early 1977, which assigned frequencies for DSB in the 12-GHz band. Although intended primarily to rally support for DSB, the Symposium also included discussions of previous DSB work, planned experiements, technical specifications, cost comparisons,

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-014-6601

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

265000

20. (cont.)
programming aspects, and legal difficulties, many of which remain to be resolved.

DIRECT SATELLITE BROADCASTING

In 1971 the World Administrative Radio Conference (WARC) for Space Telecommunications made the first allocation of frequency bands for satellite broadcasting services, and in January-February 1977 the International Telecommunications Union (ITU) sponsored a five-week WARC in Geneva, attended by 600 delegates from 111 countries, to establish a plan for broadcasting services in the 11.7-12.5-GHz band (which is to be shared with terrestrial services) for Europe, Africa, Asia, and the Pacific. A similar conference is to be held in 1982 for the Americas, likewise drawing up plans authorizing particular channels, powers, polarizations, beams, and synchronous-satellite positions for each country and for cooperating groups of countries.

With the Eurasiafrican plan as a framework within which to begin the development of direct satellite broadcasting (DSB) to homes, the European Broadcasting Union (EBU) and European Space Agency (ESA) jointly sponsored a Symposium on this topic in Dublin 23-25 May, where 380 people representing 32 countries (from every continent but Antarctica) and many international organizations heard 17 papers discussing the problems and potentialities of this new medium (see Symposium program in Appendix). Ireland, France, the UK, and West Germany together accounted for half the attendance at this excellently organized meeting, which provided simultaneous translation between French and English, coffee, tea, cookies, copies of papers and journals, and transportation to and from hotels without any registration fee or other charge--a refreshing change from the large fees too often demanded nowadays. In addition, there was a lavish reception at the State Apartments of the Dublin Castle through the courtesy of Dr. Justin Keating, Minister for Industry and Commerce.

All sessions were chaired by either Roy Gibson, Director General of the ESA or Sir Charles J. Curran, President of the EBU and retiring Director General of the British Broadcasting Corporation (BBC). While a number of working engineers were present, the flavor of the Symposium was established predominantly by the large number of dignitaries. For example, several participants were heard using "transistor" to refer to a portable radio receiver! Despite the fact that one or two members of the audience were cautioned against asking questions involving technical terms like "decibel" the Symposium was hardly devoid of technical content, but its primary aim was "educational," i.e., the building of political support for DSB in order to secure adequate financing for its development.

Television broadcasting began in 1936 in Britain with a 405-line 25-frame/sec low-VHF system, which may be phased out

in the 1980's. Frequencies and standards have been gradually rising, and a jump to around 12 GHz would not be anything unusual, this being an uncrowded band for which equipment is available and for which home antennas need not be huge.

The Symposium included the display of two items of hardware--one of them an earth station for the French-German Symphonie satellite for point-to-point transmission of TV, telephony, facsimile, and teletype; and the other a 1-m 12-GHz paraboloidal antenna made by Philips for use on the roofs of homes, pointing steadily at a synchronous satellite. (In this case the transmitter was only across the room; it was relaying by frequency modulation the TV signal from near Munich picked up outside from the Symphonie satellite by a 4.5-m 4-GHz Telefunken antenna The 1-m-diam. dish is no less aesthetic nor harder to install than the usual VHF-UHF array, although it includes a converter mounted in front of the dish, and there is an indoor unit that further converts its 1-GHz FM output to baseband or to a band suitable for an ordinary TV receiver. However, according to Robin Scott (BBC Deputy Managing Director for TV), where TV is already available, some striking innovation may be needed to gain an audience for satellite broadcasting, just as stereophony did for FM broadcasting--e.g., wide-screen or higher-definition TV.

In the European context, DSB may seem a solution in search of a problem, as figures were quoted indicating that in West Germany the addition of a second and of a third TV service produced only slight increases in the amount of viewing (130 minutes per viewer per night increased to 140 and 150). The logical application for DSB would seem to be in regions where no broadcasting network yet exists--because of their remoteness and ruggedness, their sparse settlement, or their lack of development.

In fact, India appears to be the principal pioneer in the field of DSB, having already carried out a one-year pilot project (August 1975 through July 1976) in educational TV for the schools in 2400 villages, which was described by P.V. Krishnamoorthy, Director General of India Television. There were 1.5 hours of transmission each morning for enrichment of the regular school program and 2.5 hours in the evening for adults, offering basic ideas in regard to health, hygiene, family planning, and agriculture as well as some entertainment. These were relayed by an ATS-6 (application-technology) satellite leased from NASA and were received very satisfactorily on equipment manufactured in Hyderabad, India. The same material might have been presented by means of films routed from village to village, but the satellite provided the political leverage needed in order to obtain financial support

from the Indian government. It is interesting to note that the adults in this Indian audience gave low ratings to the 40% of entertainment that was included in the broadcasts. They were impatient to see the educational portions of the broadcasts, and they and they were distressed to find the project terminating at the end of its year. This experiemtn also succeeded in elevating the law esteem in which the high-schooldropout village schoolteachers were held.

This experiment, of course, did not represent DSB to homes but, rather, DSB to something more like community antennas, as in community-antenna television. Indeed, (CATV) may figure importantly in noneducational DSB reception, as the roughly $200 anticipated cost (in large-scale production) of the home adapting equipment may in many cases make it more economical, at least in the early stages of DSB, to tie in by cable or re-broadcast to a community antenna. The latter can be larger, providing a better signal-to-noise ratio and even allowing satisfactory reception of signals not destined for the local area.

Another avenue for the arrival of foreign signals, called "spillover," results from the inability of the elliptical beam from a satellite to confine its "footprint" (i.e., its intersection with the earth's surface) to the territory belonging to a particular government or regional association. Thus, satisfactory reception will be possible in some places outside the jurisdiction, giving rise to problems that were discussed by Dr. Conor Cruise O'Brien, Minister for Posts and Telegraphs of Ireland, in the symposium's keynote speech. O'Brien contrasted the "free flow of information" philosophy with that of "states' rights," and he pointed out that South Africa has no television because TV would show too graphically the disparity in standards of living. No country permits the broadcasting of incitement to crime within its jurisdiction, but what does not seem incitement to crime at the source of a TV program, he said, may turn out to be such at the receiver.

O'Brien's talk was apparently the only one reported in the Irish press, as it reflected a strong difference with the BBC (represented by the following speaker, Sir Charles Curran, on the broadcasting of interviews with the Provisional IRA. It is not allowed in Ireland, but such programs can be picked up from the BBC in the northern and northeastern part of the Irish Republic either directly or via cable TV on the rare occasions when they are broadcast in Britain.

Shortwave and, at night, medium-wave radio broadcasts, too, regularly violate national frontiers, but O'Brien regards

radio as the "cooler medium" (though it was responsible, he pointed out, for the abortive Hungarian uprising of 1956). Sir Charles agreed that overspill constitutes "cultural invasion" even when inflicted upon willing recipients. Without being able to provide a satisfactory replacement, television has the power to wipe out local cultures that have served their areas well for centuries.

Jean Autin, President of Télédiffusion de France and Vice-president of the EBU, in discussing public-law aspects of spillover, noted that Switzerland wants to spill over into neighboring areas, and its neighbors are ready to accept this spillover. Indeed, the Vatican's "footprint" will cover all of Italy, and plans include Islamic religious broadcasts blanketing the Maghreb, the Levant, Arabia, etc.

Altogether the 1977 WARC plan involves 970 frequency assignments and 247 beams, allowing 4 or 5 channels for each area, which can, if used, be selected on the individual home receiver. The beams are assigned powers from a few watts to 1.5 kW according to the area covered. A beam with diameter of the order of 1° and power 1 kW suffices to cover a 400-mile-diam. country, while an 18° beam would be needed in order to cover nearly a hemisphere if the necessary power (400 kW) were available.

Autin mentioned the problem of protecting not only cultures but also business rights, the right of reply, and the freedom from advertising where commercial TV is not authorized, as well as protection from libel and from incitement, but he noted that penalties for violations have yet to be set. In contravention of the UN declaration on the uses of outer space, some equatorial countries have asserted their own sovereignty over any satellites stationed 23,000 miles above their territories, but they are probably not in a position to enforce this assertion.

During the discussion of Autin's talk it was observed that the effects of spillover might be reduced by domestic use of the channel or jamming of the offending channels as well as by using orthogonal polarizations. But some people will want to steer their antennas to pick up foreign signals. Another member of the audience mentioned in regard to "cultural imperialism via TV," that, because 12 million people of Italian background live in Yugoslavia, there is an exchange of programs between Italy and Yugoslavia but it has not turned the former socialist nor the latter capitalist. On the other hand, Vittorio Boni (Director of Foreign Relations for RAI, Radiodiffusione Italiana) expressed his suspicion that commercial interests are pressing

for additional channels so that advertising can be carried. Cutural invasion with advertising is already going on, he said, via X-rated films (unavailable in Italy) from Yugoslavia and by Italian broadcasts from Monaco.

Next Albert Scharf, Chairman of the EBU Legal Committee, spoke on the problems of copyright and contractual law raised by DSB: Which nation's laws apply to the rights of authors and performers? Apparently international private law regards the "principle of territoriality" as indicating the country of broadcast--not the nation launching the satellite, but the user, who originates the broadcast. Rebroadcasting, e.g., for CATV, Scharf said, may raise new and difficult questions. In the audience were representatives of authors' and performers' organizations, who made it clear that royalties are very important and that the use of recordings is a matter for much concern, as it has greatly reduced the number of performers employed.

In his talk Stelio Molo, Director General of the Société Suisse de Radiodiffusion et Télévision, expressed doubts and reservations about the desirability of DSB, asserting that not every technologically feasible development has to take place. He fears that competition may be detrimental to cultural programming and that it may break down the collective national identity arising from a whole nation's watching the same material each evening. (A questioner suggested that a program may unite or divide a people accordingly as it produces common or divergent reactions.)

Molo is worried about "planetization," too, which might produce a leveling downward as an emphasis is put on wordless programs, such as music, sports, and mime for international distribution. Switzerland offers broadcasting services in three languages, and the Swiss people, he said prefer this approach. Unlike a library, broadcast material, Molo noted, must be consumed immediately or not at all (unless it is recorded in the home). He also warned that "cultural invasion via satellite may be more dangerous than the ICBM and it may come with advertising."

Molo was followed by Robin Scott, who presented a more optimistic view. He granted, nonetheless, that programming (which is called "software" in the broadcasting trade, just as it is in computing) should be based on people's needs, which are very difficult to ascertain. Scott added that the multiplicity of languages and cultures is one of man's richest inheritances.

During the discussion period, Harder J. Rasmussen of

the Danish Ministry of Cultural Affairs pointed out that, although there is to be a Nordic DSB set of beams covering the five Nordic countries, Finland and Iceland allow advertising while the rest do not, and most Norwegians, Danes, and Swedes are glad not to have it. Otto Ness, Program Director of the Norwegian broadcasting organization (NRK) suggested that DSB may be merely an election-year political gimmick. André Lebeau (ESA Deputy Director General and Director of Planning and Future Programs) rose in his individual capacity to reject Molo's conclusions, feeling that we can't delay advances and we must prepare for suitable application of DSB, which will offer a wider choice rather than globalization. Because of the lack of choice, he said, he himself has no TV set, but he visits a neighbor occasionally to see a Greek tragedy. Bernard Pouzols, [President of the Commission on Satellites of the Syndicat des Constructeurs d'Appareils Radio Recepteurs et Téléviseurs (SCART)] remarked that the development of DSB receivers must look 20 years ahead because the average life of a French TV set is 10 years; but the requirement of compatibility, as worked out, for example, in the case of color, should go far toward alleviating such a need to plan far ahead. Later on Sir Charles Curran reported the same 10-year average life for TV sets in the UK, whose 56 million people have 18 illion TV licenses.

Following up Molo's remarks, Sir Charles Curran described an optimist as one who tells us what can be done and a pessimist as one who tells us how to do it. Molo, in turn, protrayed an optimist as one who says things couldn't be worse. Molo expects an abundance of programs to succeed in trapping nearly everyone in the net--most people probably watching the same program. Another member of the audience suggested that one program is enough; the viewer must also eat and sleep. But people I spoke with in southern Ireland, where only one program is available, thought otherwise.

In his talk comparing the cost of DSB with that of terrestrial broadcasting, Carlo Terzani (RAI and Chairman of the EBU Technical Committee) based his figures on a 7- to 10-year life for the satellite, but the unreliability that ESA has experienced with launching makes the actual cost a quite random variable. Terzani's estimate is $6M to $8M per year for the launches, satellites, and ground transmitter associated with one beam. This is to be compared with $80,000 per year for cable, he said, and with a still lower figure for radio relay. But each figure must be divided, Terzani explained, by the number of direct receivers, yielding a cost of perhaps $1 per receiver per year for DSB, which is almost neglible. He also expressed the hope that space

shuttles may reduce the cost of satellites by permitting their repair. Tim Howell, mission manager of the European Communication Satellite Programme, pointed out that CATV costs will hardly be affected by the advent of DSB, as they are dominated by the cost of the cables. He does not believe DSB can come into regular operation before 1986 on account of the time still required for experimentation and development; its arrival in developed countries will be further delayed by the need to recover the costs of their existing terrestrial facilities. In particular, Britain is not expected to adopt DSB before the year 2000.

The prospects for sound broadcasting via satellite were discussed by Calin Rosetti, mission manager of the ESA Communication Programme, and Manfred Jenke, EBU Director of Radio. Although a dozen sound channels were allocated in the 12-GHz band, they cannot be used by automobile or portable radios because of the required antenna-pointing accuracy. Rosetti suggested sound broadcasting around 1 GHz, where a 6-in. half-wave dipole antenna might suffice. He estimated the cost of the space portion of such transmission at $4 to $8 per minute. Rosetti observed that the sound-radio bands are overcrowded and overpowered except for VHF FM, and Jenke felt that radio listeners--mostly young people, drivers, and picnickers--already have a very wide choice of programs and have no time left over for additional sound-radio services. Although broadcasters' finances do not allow much expansion of their services, he suggested the broadcasting of all European music festivals or, as an alternative, the use of the sound channels to provide multilingual TV. Rosetti thought that satellite broadcasting might free terrestrial transmitters for local and regional programming. Ideas regarding audio DSB are evidently much less firm than those concerning TV DSB, and this Symposium accordingly concentrated on the latter.

In the closing session, André Lebeau of ESA Headquarters, Paris, expressing the ESA viewpoint, stressed the urgency of DSB development. The ESA Technical Center (ESTEC) in Nordwijk, Netherlands, will carry out the first of four Ariane satellite launches in July 1979, and the fourth, designated L04, is to take place in October 1980, carrying equipment into synchronous orbit that will provide facilities for testing DSB concepts in a three-year, three-stage program. In the successive stages there will be increasing numbers of receivers, reaching thousands in the final, preoperational stage, with some of them in shop windows.

Two consortia are competing for the $21M job of building the satellite payload, which, as earlier speakers had mentioned (despite the injuction to avoid being technical), will include

a 450-W coupled-cavity-tube transmitter and a 150-W helix-tube transmitter, both using the same reflector to send two steerable 0.8° x 1.4° beams in directions controlled by a terrestrial beacon to within 0.05°. These beams, with a fixed separation, will be directed successively to various areas in Europe, North Africa, and the Near East. The signals to be retransmitted on 12 GHz by the satellite via FM of 27-MHz bandwidth will be received from the ground in the 14-14.5-GHz band. The satellite will also carry 20- and 30-GHz beacons to measure the higher-frequency propagation and may carry a 30/20-GHz transponder with which to try city-to-city transmission. Experiments will test the launching, station keeping (intended to be to within 0.1° in each direction), and space qualification of the apparatus, as well as the overall performance of the DSB system.

In the concluding speech, Sir Charles Curran observed that the Symposium had shown the satellite will work, that it will do what is needed, and that receivers with adequate performance will be available at a suitable price if the demand for them is large enough. DSB, he said, should not be a substitute for regional or national services, but it may free terrestrial transmitters for more local programming. (At present the BBC operates two national television networks with only very minor regional variations and with transmitters so tightly linked that they cannot transmit their individual identities even once a day.)

Programs of some new sort will be needed in order to attract a mass audience to DSB, Curran stated, but broadcasters are already doing their utmost to attract the widest audiences. In fact, he said, according to a survey of newspaper readers in the UK, Britons are spending no more time watching TV now than ten years ago (when very few color sets were in use). In this situation Curran wondered whether broadcasters can expect from their viewers or advertisers the additional funding that will be needed for DSB.

The proceedings of the Symposium will be published by the EBU, which has 31 active members in Europe, North Africa, and the Near East and has 41 associate members outside these areas. (However, neither Taiwan nor any member of the Sino-Soviet bloc is affiliated, although the names of three Poles and two Czechoslovaks appeared on the list of delegates attending the Symposium.) Its headquarters are in Geneva and its Technical Centre in Brussels, each publishing the *EBU Review* in alternate months. Meanwhile, the April 1977 issue of this *Review* (price 100 Belgian francs) is devoted to technical aspects of DSB, and the May 1977 issue (12 Swiss francs) presents legal, programming, and administrative

aspects. The address is EBU Review, European Broadcasting Union, case Postale 193, 1211 Geneva 20, Switzerland, or Ave. Albert Lancaster 32, 1180 Brussels, Belgium.

APPENDIX. PROGRAM OF SYMPOSIUM

Monday 23 May (morning)

09.30 OPENING SESSION chaired by

Roy Gibson, Director General of the European Space Agency (ESA) and
Sir Charles Curran, President of the European Broadcasting Union (EBU)

Opening speech by
Justin Keating, TD, Minister for Industry and Commerce, Ireland

Keynote speech

General framework for the coming development of direct satellite broadcasting: human and scientific considerations

by

Conor Cruise O'Brien, TD, Minister for Posts and Telegraphs, Ireland

Break

Monday 23 May (continued)

11.15 FIRST WORKING SESSION
Chairman: The Director General of the European Space Agency (ESA)

1st theme

1. The technical possibilities of direct broadcast satellites

   Speaker: ESA - André Lebeau, Deputy Director General, Director of Planning and Future Programmes

2. Broadcasters' viewpoints on the subject; results of the ITU Planning Ccnference and its consequences

   Speaker: EBU- Rudolf Gressmann, Director of the EBU Technical Centre

Discussion

13.00 End of first working session

Monday 23 May (afternoon)

15.00 SECOND WORKING SESSION

Chairman: The President of the European Broadcasting Union (EBU)

2nd theme

1. Experiments under way and future project; their possible implications for Western Europe

(a) A general view

Speaker: ESA - Anne-Marie Hieronimus, Head of Future Telecommunications Department

(b) Description of experiments

- ESA experiment

Speaker: ESA - B.L. Herdan, Project Manager

Monday 23 May (continuation of the SECOND WORKING SESSION)
(continuation of the 2nd theme)

- The Indian Satellite Instructional Television Experiment (SITE)

Speaker: P.V. Krishnamoorthy, Director General, India Television

This lecture will be accompanied by a film: "A communication strategy for development" (produced by the British Council and Doordashan (India Television))

DISCUSSION

18.00 End of the second working session

20.00 Official reception at State Apartments, Dublin Castle for delegates and accompanying family members at the invitation of Mr. Justin Keating, TD, Minister for Industry and Commerce

Tuesday 24 May (morning)

09.30 THIRD WORKING SESSION

Chairman: The Director of the European Space Agency (ESA)

3rd theme

An economic view: schematic comparison with the cost of the terrestrial broadcasting systems

Speaker: EBU - Carlo Terzani (RAI), Chairman of the European Broadcasting Union Technical Committee

DISCUSSION

Tuesday 24 May (continuation of the THIRD WORKING SESSION)

4th theme

Individual and collective reception (cable, etc.)

(a) Technological and financial aspects

Speaker: ESA - René Collette, Head of European Communication Satellite Programme

(b) Receiving equipment in certain countries (Canada, Japan, etc.)

Speaker: ESA - T. Howell, Mission Manager of European Communication Satellite Programme

DISCUSSION

Break

5th theme

Technically unavoidable spillover (technical aspects and international public law aspects)

Speaker: EBU - Jean Autin, President, Télédiffusion de France, Vice Presi-ent of the European Broadcasting Union

DISCUSSION

13.00 End of the third working session

Tuesday 24 May (afternoon)

15.00 FOURTH WORKING SESSION

Chairman: The President of the European Broadcasting Union

6th theme

Problems of private law raised by direct broadcast satellite operations

Speaker: EBU - Albert Scharf (ARD), Chairman of the EBU Legal Committee

DISCUSSION

Break

Tuesday 24 May (continuation of the FOURTH WORKING SESSION)

7th theme

Prospects for radio in the satellite era and programme possibilities (comparison with terrestrial transmitters, characteristics of transmitters on the satellite, financial aspects)

(a) Technological and financial aspects

Speaker: ESA - Calin Rosetti, Mission Manager of Communication Programme

(b) Programme possibilities

Speaker: EBU - Manfred Jenke, Director of Radio (ARD/WDR)

DISCUSSION

18.00 End of the fourth working session

Evening Optional social events (advance booking)

Wednesday 25 May (morning)

09.30 FIFTH WORKING SESSION

Chairman: The President of the European Broadcasting Union

8th theme

The challenge of communication by direct broadcast satellites: viewers' needs and broadcasters' opportunities

Speaker: EBU - Stelio Molo, Director General of Société Suisse de Radiodiffusion et Télévision

Speaker: EBU - Robin Scott, Deputy Managing Director, Television, British Broadcasting Corporation

DISCUSSION

Break

Conclusions and closing addresses

13.00 (approximately) - CLOSING OF THE SYMPOSIUM